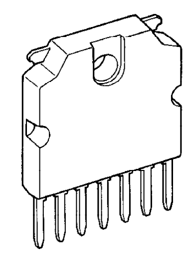
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA7267BP

## BRIDGE DRIVER

The TA7267BP is a Bridge Driver for brushed DC Motor Rotation control.
Forward Rotation, Reverse Rotation, Stop and Braking operations are available.
It's designed for Loading and Reel Motor driver for VCR and Tape Deck, and any other consumer and industrial applications.
TA7267BP have Operation Supply Voltage terminal and Motor Driving Supply Voltage terminal independently, therefore Servo control operation is applicable.



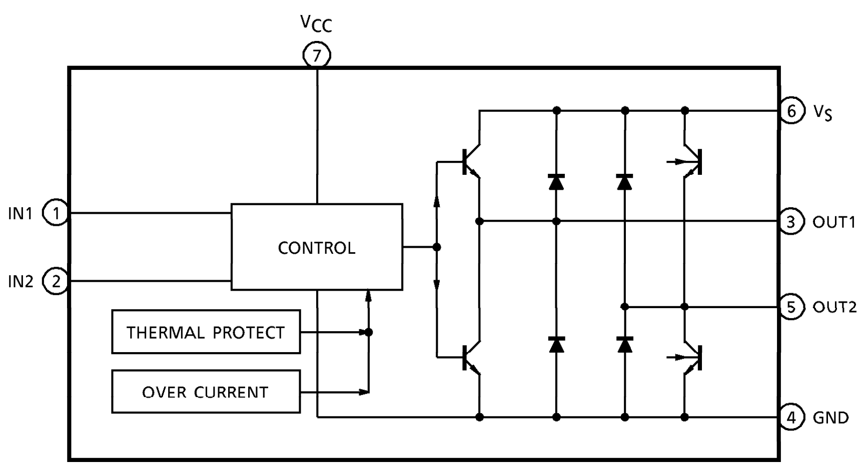
HSIP7-P-2.54A

Weight : 2.15g (Typ.)

### FEATURES

- Output Current Up to 1.0A (AVE.), and 3.0A (PEAK).
- 4 Function Modes (CW, CCW, STOP and Brake) are Controlled by 2 Logic Signals Fed Into 2 Input Terminals.
- Build in Over Current Protector and Thermal Shut Down Circuit.
- Operating Voltage Range : $V_{CC\,(opr.)} = 6\sim18V$, $V_{S\,(opr.)} = 0\sim18V$

### BLOCK DIAGRAM

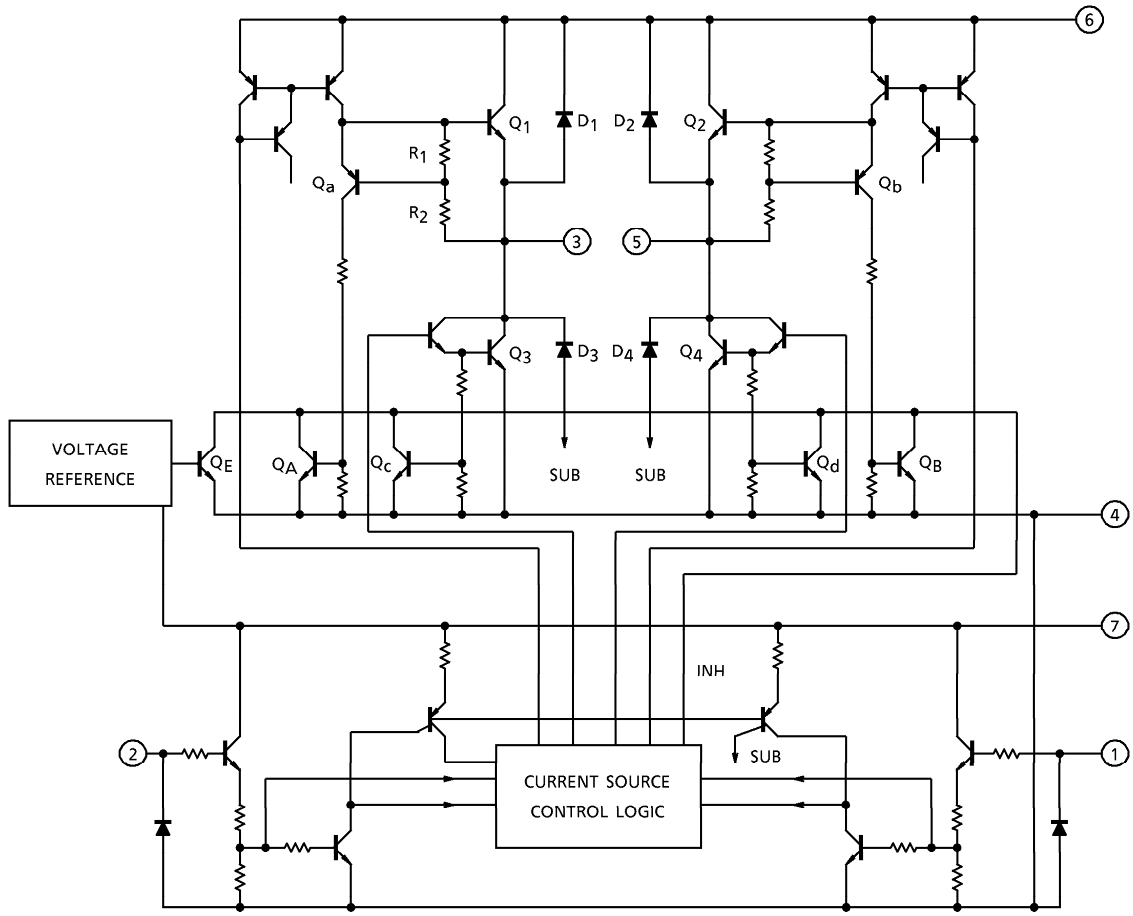



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**PIN FUNCTION**

| PIN No. | SYMBOL | FUNCTIONAL DESCRIPTION |
|---|---|---|
| 1 | IN1 | Input terminal |
| 2 | IN2 | Input terminal |
| 3 | OUT1 | Output terminal |
| 4 | GND | GND terminal |
| 5 | OUT2 | Output terminal |
| 6 | $V_S$ | Voltage supply terminal |
| 7 | $V_{CC}$ | Voltage supply terminal |

**INTERNAL CIRCUIT**



**FUNCTION**

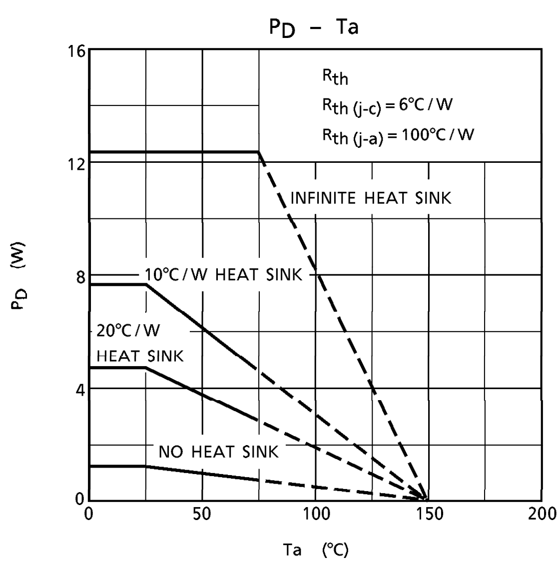
| IN1 | IN2 | OUT1 | OUT2 | MODE |
|---|---|---|---|---|
| 1 | 1 | L | L | Brake |
| 0 | 1 | L | H | CW / CCW |
| 1 | 0 | H | L | CCW / CW |
| 0 | 0 | High Impedance | | Stop |

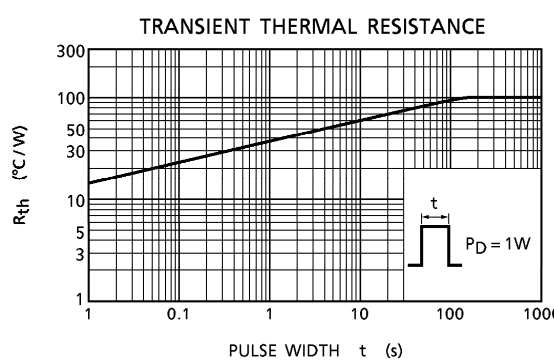
**MAXIMUM RATINGS** (Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | RATING | UNIT |
|---|---|---|---|---|
| Supply Voltage | PEAK | $V_{CC}$ (MAX.) | 25 | V |
| | OPERATE | $V_{CC}$ (opr.) | 18 | |
| Output Current | PEAK | $I_O$ (PEAK) | 3.0 | A |
| | AVE. | $I_O$ (AVE.) | 1.0 | |
| Power Dissipation (Tc = 25°C) | | $P_D$ | 12.5 | W |
| Operating Temperature | | $T_{opr}$ | −30~75 | °C |
| Storage Temperature | | $T_{stg}$ | −55~150 | °C |

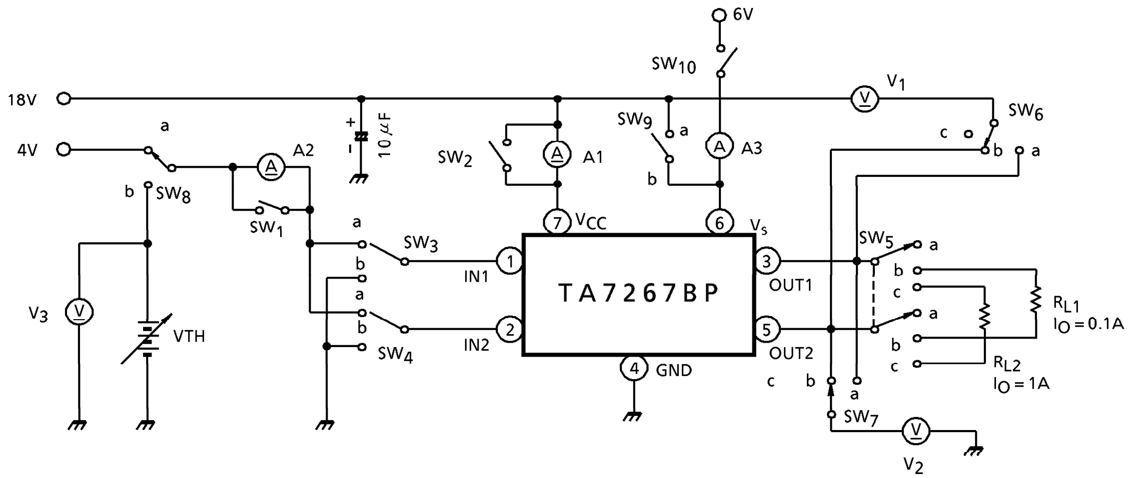
**ELECTRICAL CHARACTERISTICS** (Unless otherwise specified, Ta = 25°C)

| CHARACTERISTIC | | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|---|
| Supply Current | | $I_{CC1}$ | — | $V_{CC}$ = 18V, Output OFF Stop mode | — | 1.8 | 3.5 | mA |
| | | $I_{CC2}$ | | $V_{CC}$ = 18V, Output OFF CW / CCW mode | — | 8.3 | 12 | |
| | | $I_{CC3}$ | | $V_{CC}$ = 18V, Brake mode | — | 8.5 | 13 | |
| Saturation Voltage | Upper | $V_{S1}U$ | — | $V_{CC}$ = 18V, $I_O$ = 0.1A | — | — | 1.1 | V |
| | Lower | $V_{S1}L$ | | | — | — | 1.0 | |
| | Upper | $V_{S2}U$ | | $V_{CC}$ = 18V, $I_O$ = 1.0A | — | 1.2 | 1.5 | |
| | Lower | $V_{S2}L$ | | | — | 1.05 | 1.4 | |
| Output Transistor Leakage Current | Upper | $I_L$ U | — | $V_S$ = 25V | — | — | 50 | μA |
| | Lower | $I_L$ L | | | — | — | 50 | |
| Input Voltage 1, 2 | | $V_{IN (H)}$ | — | $T_j$ = 25°C, pin① and pin② | 3.0 | — | — | V |
| | | $V_{IN (L)}$ | | | — | — | 0.8 | |
| Input Current 1, 2 | | $I_{IN1, 2}$ | — | $T_j$ = 25°C, pin① and pin② | — | 1 | 30 | μA |
| Diode Forward Voltage | | $V_F$ U | — | $I_F$ = 1A | — | 2.0 | — | V |
| | | $V_F$ L | | | — | 1.3 | — | |
| Limiting Current | | $I_{SC}$ | — | — | — | 2.5 | — | A |



## TEST CIRCUIT




## TEST METHOD

| CHARAC-TERISTIC | $SW_1$ | $SW_2$ | $SW_3$ | $SW_4$ | $SW_5$ | $SW_6$ | $SW_7$ | $SW_8$ | $SW_9$ | TEST METER |
|---|---|---|---|---|---|---|---|---|---|---|
| $I_{CC1}$ | CLOSE | OPEN | b | b | a | c | c | a | a | A1 Use |
| $I_{CC2}$ | CLOSE | OPEN | a | b | a | c | c | a | a | |
| $I_{CC2}$ | CLOSE | OPEN | b | a | a | c | c | a | a | |
| $I_{CC3}$ | CLOSE | OPEN | a | a | a | c | c | a | a | |
| $V_{S1\ U}$ | CLOSE | CLOSE | b | a | b | a | c | a | a | $V_1$ Use, $I_O = 0.1A$ |
| $V_{S1\ U}$ | CLOSE | CLOSE | a | b | b | b | c | a | a | |
| $V_{S1\ L}$ | CLOSE | CLOSE | b | a | b | c | b | a | a | $V_2$ Use, $I_O = 0.1A$ |
| $V_{S1\ L}$ | CLOSE | CLOSE | a | b | b | c | a | a | a | |
| $V_{S2\ U}$ | CLOSE | CLOSE | b | a | c | a | c | a | a | $V_1$ Use, $I_O = 1A$ |
| $V_{S2\ U}$ | CLOSE | CLOSE | a | b | c | b | c | a | a | |
| $V_{S2\ L}$ | CLOSE | CLOSE | b | a | c | c | b | a | a | $V_2$ Use, $I_O = 1A$ |
| $V_{S2\ L}$ | CLOSE | CLOSE | a | b | c | c | a | a | a | |
| $V_{TH1}$ | CLOSE | CLOSE | a | b | b | c | c | b | a | $V_3$ Use Function Check |
| $V_{TH2}$ | CLOSE | CLOSE | b | a | b | c | c | b | a | |
| $I_{SC}$ | CLOSE | CLOSE | a | b | b | c | c | a | b | A3 Use, $SW_{10}$ = CLOSE |
| $I_{IN1}$ | OPEN | CLOSE | a | b | b | c | c | a | a | A2 Use |
| $I_{IN2}$ | OPEN | CLOSE | b | a | b | c | c | a | a | |

## NOTES WHEN USING THE TA7267BP

The full bridge driver, TA7267BP, is an IC specifically developed to control rotation switching in brush motors. This IC has been carefully designed and strengthened to withstand counter-electromotive force or start up rush current, which are problems in driving brush motors.
However, as with other power ICs, application circuits must be designed not to apply surge voltage or excess current that exceeds the standard values.
In addition, when designing PCBs, make sure the wiring pattern does not cause oscillation, which can result in equipment malfunction or destruction of the IC.
The following are notes on TA7267BP use. These should be reflected at the design stage.

1. Maximum voltage and current

   The maximum supply voltage (pins ⑥ and ⑦) for TA7267BP is 25V.
   Operating supply voltage is in the range of 6~18V. No voltage exceeding this range should be applied to pins ⑥ or ⑦.
   The maximum current is 1.0A (AVE.) or 3.0A (PEAK). The circuit should be designed so that rush current at startup does not exceed peak current, and average current at steady operation does not exceed 1.0A.

2. External diodes

   As the block diagram shows, TA7267BP has internal diodes. The lower two diodes, which are the IC's internal parasitic diodes, have a relatively large capacitance. However, when a motor with a large reactance such as a core motor is driven, the upper two diodes may be damaged by the motor's counter-electromotive force.
   In such a case, connect external diodes in parallel.
   The lower diodes should not be subjected to high current. Therefore, in such cases as brake operation, external diodes should be connected.

3. PCB design

   The following points concern the TA7267BP pattern design around the power supply line (pins ⑥ and ⑦) and the pattern design of the GND (pin④).

   a. Ensure that the bypass capacitor between pin⑥, pin⑦, and GND does not share impedance with other lines.
   b. The GND line should not be shared by other circuits.
   c. The capacitance of the bypass capacitor should be as large as possible.

4. Oscillation remedies

   To prevent noise from sparks when using brush motors, a capacitor may be connected between both pins.
   When using TA7267BP, the capacitor is connected between output pins ③ and ⑤. This may cause oscillation.
   Therefore, avoid connecting the capacitor where possible. If connection is necessary to overcome noise, connect resistors in series as shown in the technical data.
   The values for the capacitor and resistors must be determined according to the motor. However, recommended values are about 0.1$\mu$F and 33$\Omega$.

**APPLICATION NOTE**

(1) Input circuit

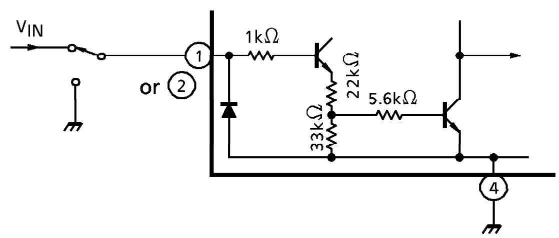



Fig.1

Input circuit is shown in Fig.1. It's a "High Active" type.
If a voltage above specified $V_{IN\,(H)}$ value fed into input terminal that means "Logic 1", and the voltage less than $V_{IN\,(L)}$ or connect to GND means "Logic 0".
And the circuit have a hysteresis for stable operation. (See Fig.2)

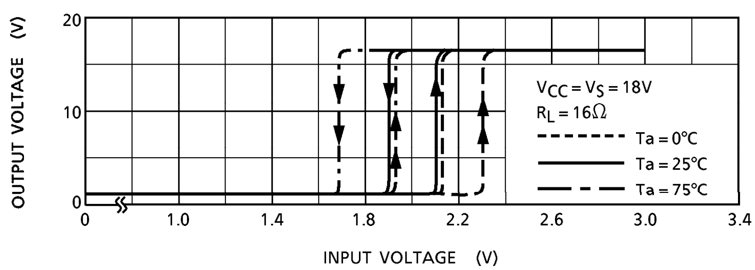



Fig.2 $V_{IN} - V_{OUT}$ characteristics

(2) Basic application circuit

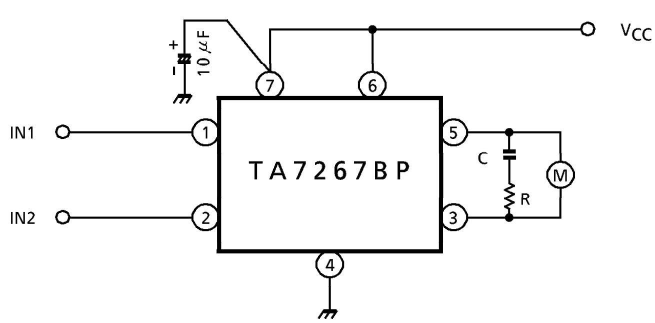



Fig.3

(Note 1) Fig.3 shows the basic application circuit.
Optimum values of the C, R depend on the inherent constant of a motor and parasitic C, R values around the circuit.

(Note 2) Utmost care is necessary in the design of the output line, $V_S$ and GND line since IC may be destroyed due to short-circuit between outputs, air contamination fault, or fault by improper grounding.

(3) Additional diode

i) If the braking operation is so loose, connect a additional diode between each output to GND. (See Fig.4)

ii) If the back electromotive pulse generated in output coil is so strong. Internally connected back electromotive suppression diode may be damaged by this pulse. In such a case connect a additional diode between each output to $V_{CC}$. (See Fig.5)

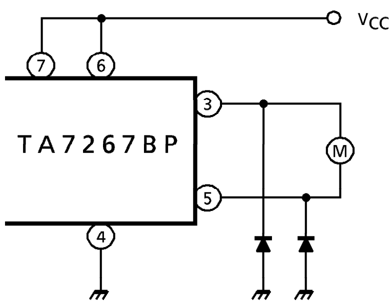



Fig.4

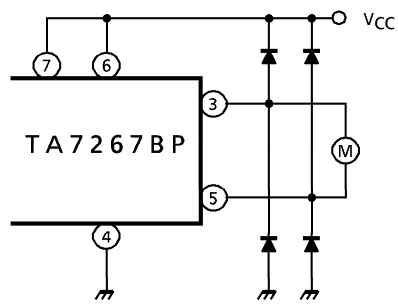
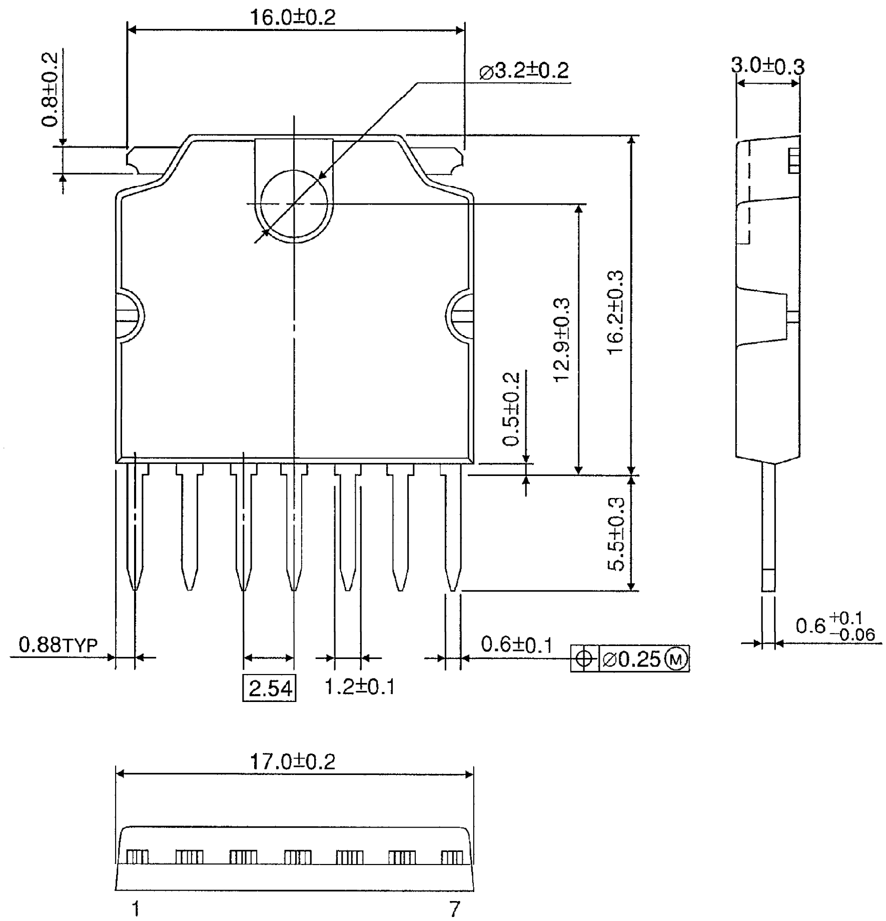



Fig.5

**OUTLINE DRAWING**

HSIP7-P-2.54A

Unit : mm




Weight : 2.15g (Typ.)